MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2017/2018

PMT0201 – MATHEMATICS II

(All sections / Groups)

4 JUNE 2018
2.30 p.m. – 4.30 p.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This Question paper consists of **5 pages** only including the cover page with **4 Questions.**

2. Attempt **ALL FOUR** questions. The distribution of the marks for each question is given.

3. Please write your answers in the Answer Booklet provided, and **START EACH QUESTION ON A NEW PAGE.**

4. Show proper steps.

Question 1 (10 Marks)

(a) The point $P\left(\frac{3}{5}, y\right)$ is on the unit circle in Quadrant IV. Find its y-coordinate.

[2 marks]

(b) Given θ is an angle in Quadrant III and $\sin\theta = -\frac{4}{7}$. Without calculator, find the exact value of $\sec\theta$. **[2 marks]**

(c) Given that $y = 3\cos\left(2x - \frac{\pi}{2}\right)$.

(i) Find the amplitude, period, and phase shift of the given y.

(ii) Sketch one complete period of $f(x) = 3\cos(2x)$.

(iii) Then at the same graph, sketch one complete period of

$$y = 3\cos\left(2x - \frac{\pi}{2}\right).$$

State clearly the x and y intercepts if exist. **[4 marks]**

(d) Without calculator, find the exact value of

$$\sin^{-1}\left(\cos\left(\frac{4\pi}{5}\right)\right). \quad \textbf{[2 marks]}$$

[Hint: $\cos^{-1}(x) = \frac{\pi}{2} - \sin^{-1}(x)$ may be useful]

Continued...

Question 2 (15 Marks)

(a) (i) Show that

$$\frac{1+\cos(2x)}{\sin(2x)}=\cot(x).$$

(ii) Then without calculator find $\cot(67.5^\circ)$. **[4 marks]**

(b) Solve the equation $2\cos^2\theta+3\sin\theta-3=0$ where $0\le\theta<2\pi$. **[3 marks]**

(c) A triangle ABC has $a=20$, $c=25$ and $\angle A=35^\circ$.

(i) Based on the given information, sketch the triangle ABC.

(ii) Solve the triangle ABC. Round your answers to **four** decimal places.

[4 marks]

(d) Given that complex number $z=-1+\sqrt{3}\,i$.

(i) Graph z on the complex plane.

(ii) Then find the polar form of z.

(iii) Use **De Moivre's Theorem** to find z^6. Leave the answer in the form of $z^6=a+bi$ where $a,b\in\Re$. **[4 marks]**

Continued...

Question 3 (15 Marks)

(a) Find the limits. Show at least one intermediate step.

(i) $\lim_{x\to 5}\dfrac{x-5}{x^2+x-30}$

(ii) $\lim_{x\to 0}\dfrac{x}{(1-x)^2-1}$ **[3 marks]**

(b) Let

$$f(x)=\begin{cases}(x+1)^2-1, & \text{if } x<0\\ \dfrac{5}{4}\sin(x\pi), & \text{if } x\geq 0\end{cases}$$

Determine whether f is continuous at 0. Show proper steps. **[3 marks]**

(c) Use the **formal definition** of derivative to find $g'(-1)$ when $g(x)=x^2+3x$.

[3 marks]

(d) Find the derivatives of

(i) $y=x^3\ln x$.

(ii) $y=\dfrac{\sin(x)}{1-4x}$. **[2 marks]**

(e) Let $f(x)=x^4-8x^2$.

(i) Find the critical points.

(ii) From (i), determine the absolute maximum and minimum values of the function f. **[4 marks]**

Continued...

Question 4 (10 Marks)

(a) Compute the integral

$$\int_0^1 x(x^2+1)^3 dx\,.$$ **[3 marks]**

(b) Use **integration by parts** to find

$$\int xe^{6x} dx\,.$$ **[3 marks]**

(c) Given the curves $y = x + 2$ and $y = x^2$.

i) On the same axes sketch the curves and find the points of intersections between the curves.

ii) Find the area of region enclosed by the two curves. **[4 marks]**

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